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TIME TO CUT THE CORD?

CONSUMING ENERGY TO THE POINT OF CRISIS





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8 UPFRONT

Fuelling the future

Energy demand and fuel prices continue to increase—that, coupled with continual upheaval in energy hotspots around the world, leads many to believe that an energy shortage is unavoidable. But what really is the prognosis for the future of conventional fuel?

By Jim Donnelly

12 COVER STORY

Time to cut the cord? Consuming energy to the point of crisis

Our energy consumption habits are not only putting a strain on what we all know are finite resources, but also putting duress on our environment, economies and energy infrastructure. Our non-renewable resources will eventually be depleted—that's not in question. What is in question is what can be done to turn our path away from crisis.

By Kris Foster

16 ALUMNI PROFILES

Energy from waste

In the world of Andreas Tsangaris, BEng/80, MEng/83, garbage equals energy—that equation has been his career's pursuit for 26 years. As chief scientist at Plasco Energy Group he helped develop the process and equipment to make this equation a reality and help solve the world's energy and waste problems.

By Kris Foster

Turning tides

Justin Blanchfield, BEng/04, may be riding the wave of the future. As he works towards his master's degree at the University of Victoria, his research points to the sea—he has seen first-hand the energy potential found in the ebb and flow of tides.

By James Hale

30 CLASS ACTS

What have Carleton alumni been up to over the summer? At spring convocation we celebrated the largest graduating class in Carleton's history; Carleton also celebrated with Jennifer Luce, BArch/84, the 2007 winner of the A.D. Dunton Alumni Award of Distinction; Les MacDonald, MA/74, PhD/85, shares a story on building an energy-efficient and environmentally friendly home and living off the grid; plus more alumni news on careers, accomplishments, marriages and babies.

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EDITOR'S NOTE

Photo: Mike Pinder



I don't remember when you could buy a soda pop and a candy bar for a nickel—and still have change left over to see a moving picture show—but I do remember when you could buy gasoline for less than 80 cents per litre. Those days are long gone. So long gone, in fact, that when we see the price per litre hovering around one dollar we think we're getting a hot deal at the pump. These continual, incremental increases hit us where it hurts—the wallet—but the pain caused is fleeting. Are these increases evidence of a looming energy crisis? Maybe not, but that doesn't mean we should ignore the issue until it becomes a crisis.

So, the question remains how do we define an energy crisis? A constant blinking of digital 12:00s, caused by a blackout, is how my alarm clock would define an energy crisis. And if our alarm clocks were in a constant and prolonged state of flashing 12:00s then we would have our wake-up call, so to speak. But this has never happened for more than a couple days at a time.

In actuality, those of us in the western world have always had energy and fuel in supply sufficient to meet demand. This doesn't mean we aren't in jeopardy of an energy crisis—not when non-renewable energy resources are being consumed at a higher rate than ever before. Energy and fuel are so integrated into our culture and everyday life that we no longer have an appreciation for them. We assume there will always be power for all of our needs. But what if there wasn't enough energy? Would we revert back to a lifestyle similar to what existed 100 years ago? If it resembles a prolonged camping trip, to me, that's a crisis. I have nothing against the great outdoors—I like fresh air, unsullied smells, peaceful sounds and wildlife (wildlife that isn't prone to attacking humans). That said I would rather: cook with an oven, not an open flame; wash my hair with hot water, not cold; sleep in a temperature-controlled environment, not under the stars; and enjoy some of the other amenities that an energy-charged life has to offer.

The thought of life without power is a sobering one. But we are a pretty creative and industrious group here on Earth—as showcased in this issue of *Carleton University Magazine*. Carleton's alumni and faculty are researching and developing alternate forms of energy derived from garbage, plants and the ocean; they're helping guide energy and environmental policy with their research and expertise; and they're even building houses off the grid.

Just as our ancestors from a century ago couldn't predict what life would look like a hundred years into the future, neither can we. One thing is certain: it will be interesting to see.

Kris Foster
Editor

university magazine
carleton fall 2007

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Carleton University is a member of the Canadian Council for the Advancement of Education.

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MAGAZINE MISSION STATEMENT

Carleton University Magazine is published three times a year for the university's alumni, faculty, staff and friends. The magazine is the university's primary vehicle for providing information on the accomplishments of alumni, faculty and students, and on significant issues and developments within the university community and the alumni association. The magazine is distributed to 70,000 alumni worldwide.

Return undeliverable Canadian addresses to:

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Tel: 613-520-3636

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Email: advancement@carleton.ca

Website: carleton.ca/alumni

Publication Mail Agreement No. 41036526

ISSN 0226-5389

magazine.carleton.ca



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FROM THE TOP

With the world's population estimated to grow to 8.9 billion by the year 2050, the threat of a sustained energy crisis is a looming reality. We have only to look at the past three decades to recognize a disturbing pattern. In 1973, the first historical oil crisis was realized when OPEC placed an embargo on the export of petroleum products to countries, including Canada and the U.S., that had sided with Israel during the Yom Kippur War. The second hit in 1979 after a revolutionary war in Iran destabilized the industry. Fast forward to 1990 when the Gulf War caused the latest oil crisis on record. With the current situation in the Middle East, some experts predict that another energy crisis is imminent. Indeed, the energy situation today is a major influence on world politics.

World trends, including increases in standards of living, greater sensitivity to environmental issues, such as pollution and global warming, and dependence on a non-renewable supply of fossil fuels, have raised questions concerning how the world's future energy needs will be met.

At Carleton, we have several academic programs dedicated to sustainable energy resources and other relevant environmental issues. In addition, there is a rich and diverse group of researchers whose vision and dedication to the complex fields of alternative fuels, biofuels, and sustainable energy development hold promise for the future. In this issue of *Carleton University Magazine*, you will meet a cross-section of these brilliant faculty members and glean an introduction to their important work.

Carleton hosts several Canada Research Chairs dedicated to the topic of energy. Matthew Johnson holds the Canada Research Chair in Energy and Combustion Generated Air Emissions, and recently joining us is Ian Beausoleil-Morrison, who holds the Canada Research Chair in Modeling and Simulation of Innovative Energy Systems for Residential Buildings. The Faculty of Public Affairs is home to several policy experts, such as Bruce Doern, working on Canadian and comparative public policy related to energy and the environment. Also profiled are Owen Rowland and Myron Smith, both working on innovative and unique ways to develop sustainable biofuels, and from our history department Tim Krywulak has a newly published book *Fuelling Progress: One Hundred Years of the Canadian Gas Association, 1907-2007*. These are but a few of our researchers in this domain.

I hope that as you read, you feel some of the enthusiasm I did, and perhaps even draw the same conclusion I have—that Carleton has much to contribute to important global issues.

Kim Matheson
Acting Vice-President (Research and International)
Carleton University



CHAIRS THAT WILL REVOLUTIONIZE ENGINEERING

Smart houses and robots in space are research areas that got a significant boost with the announcement of Carleton University's two latest Canada Research Chairs.

Ian Beausoleil-Morrison is the new Canada Research Chair in Modeling and Simulation of Innovative Energy Systems for Residential Buildings, and Alex Ellery is the Canada Research Chair in Space Robotics and Space Technology.

"These two new Canada Research Chairs will continue to place Carleton at the leading edge of engineering research both at the Canadian and international level," says Kim Matheson, acting vice-president (research and international). "We look forward to their research results as they will definitely make a difference in how we live."

Beausoleil-Morrison will examine innovative and emerging energy concepts for houses and apartments which, in Canada, account for 17 per cent of our energy consumption. He will focus on approaches that minimize our dependency on electricity during peak hours as well as ways of exploiting solar energy to heat and cool our homes. "My research will provide solutions to manufacturers, energy utilities, and governments to help them significantly reduce greenhouse gases and our dependence on traditional energy sources," says Beausoleil-Morrison.

Ellery has an enviable record working with organizations such as the European Space Agency on the problems of space-based robotics. Using laboratory equipment to simulate space environments, Ellery will develop techniques to ensure that robots can function effectively in harsh conditions at zero or low gravity environments, out of reach of human operators, and too

far away to remotely control via radio links—such as conditions on the surface of Mars. "I am hoping that my research will help enable a whole new wave of space exploration," says Ellery.

Carleton University now has a total of 23 Canada Research Chairs. In addition, the university has five NSERC Research Chairs and three Endowed Chairs. For more information visit carleton.ca/cu/research/chairs/canada_chairs/index.html.

SERVING STUDENTS

Suzanne Blanchard has been appointed to the position of associate vice-president (student support services) as a career development assignment for one year. Blanchard brings to this position a proven track record in managing and leading student-centered services, as well as the knowledge, skills and experience to lead the Student Support Services portfolio in providing an exceptional experience for Carleton University students.

She has worked in the field of post-secondary education since the late 1980s at the Ministry of Colleges and Universities, La Cité collégiale and with Carleton University—initially as director of Admission Services and most recently as University Registrar. Visit carleton.ca/studentsupport/index.html for information on student services.

A NORTHERN STAR

Carleton University graduate student Paul Smith has been named one of Canada's most promising northern scholars. Smith, a PhD candidate in biology, was

awarded a Canadian Northern Studies Trust Garfield Weston Award for Northern Research for his project *Breeding Ecology of Eastern Arctic Shorebirds* from the Association of Canadian Universities for Northern Studies. Funding for the Garfield Weston Awards for Northern Research is provided by the W. Garfield Foundation.

"Carleton University researchers and students contribute greatly to expanding our understanding of northern studies," says John Shepherd, BA/70, BMus/72, dean of the Faculty of Graduate Studies and Research. "This award is a testament to Paul's dedication to this field and we're proud that Carleton is able to provide him with the research environment that furthers his interest in this important area."

Smith's research examines the ecology of Arctic shorebirds and attempts to understand the factors that limit breeding and how these factors might be influenced by environmental change. With up to 80 per cent of northern shorebird populations in decline, his work is urgently needed as the causes are unclear and the southern public is largely unaware.

"This scholarship will allow me to continue my work to improve our knowledge and understanding of the situation," says Smith. "I take pride in knowing that my work contributes to conservation and raising public awareness."

Smith is among the first five doctoral students to receive the prestigious scholarship, valued at \$40,000 over two years. He is a recipient of the 2006-2007 J.H. Stewart Reid Memorial Scholarship and the 2006-2007 Orville Erickson Memorial Scholarship.

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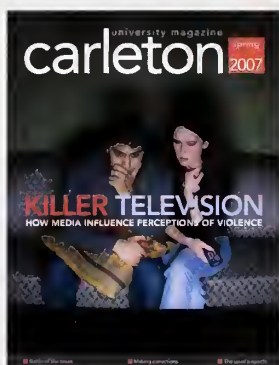
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EDUCATING BULLIES

I found the article "Battle of the Sexes" interesting because of the importance it has to the education system. I run a website dedicated to education in Catholic schools in Canada and bullying is a very relevant topic.

I also enjoyed the "Killer Television" piece. Well done.

John Borst,
Editor, Tomorrow's Trust



ON A FEW TOPICS

As an instructor in criminology and criminal justice in the Department of Sociology and Anthropology, I found the spring 2007 issue of the *Carleton University Magazine* very interesting indeed. I would, however, like to correct an

error in the article "Battle of the Sexes" where it states that "You never hear

any children reciting rhymes about Jack the Ripper." In fact there is a very familiar rhyme about Jack the Ripper that is still recited by children to this day, particularly in Great Britain. It goes like this:

*Jack the Ripper's dead
And lying in his bed
He cut his throat
With Sunlight soap
Jack the Ripper's dead.*

The article makes valid points about bullying behaviour among boys and girls. An interesting research question is whether the techniques and experience of bullying learned and acquired in the playground translates to bullying practices among adults in the workplace.

I was delighted to read about the establishment of the Donald R. Yeomans Bursary. After graduating from the Cambridge Institute of Criminology I had the pleasure of working with Mr. Yeomans at Correctional Service of Canada. Don Yeomans was an innova-

tive thinker who recognized the importance of using empirical research to develop effective corrections policy. He made a significant contribution to corrections in Canada and I am proud to have worked with him during those challenging and pivotal years in corrections.

Darryl T. Davies,
Ottawa

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He has consulted with organizations around the world and is a sought-after media commentator on strategic management issues. Ian has been featured in The Wall Street Journal, The Globe and Mail, National Post, Macleans and on CBC radio and television.

In consultation with industry, the public sector and students, Ian will lead the evolution of the Sprott MBA program to meet the changing needs of today's career-minded professionals. To learn more about the Sprott MBA visit us online at sprott.carleton.ca/academic/mba/or contact us at mba_info@sprott.carleton.ca



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FUELLING THE FUTURE

BY JIM DONNELLY

When Rich Couillard, BScHons/72, got a chance to christen his own company back in September of 2003, the Calgary-based energy prospector says he didn't miss a beat.

"I've had a long fascination with Portuguese explorers," he explains from his Calgary office. Before his private company—eventually dubbed Escavar Energy after the Portuguese word for "dig"—was born, he says he and his business partner spent hours rifling through dictionaries for the perfect moniker.

But there was one thing on which he hadn't counted. "It's the exploration industry, so people are big on exciting-sounding names," he confides with a laugh. "Any name with an explorer, a planet, a bird of prey—they were all taken already."

It was perhaps a hint of foreshadowing for Couillard, a former executive with energy companies like Chevron USA, Numac Energy, Pan Asian Energy and Oilsphere. After he and his partner raised more than \$30 million in private funding to start Escavar four years ago, the two broke ground in the seemingly endless search for energy in Alberta's vast plains.

"We were, as they say, two guys with big hats and no cows," he reflects. "We went to the market with our signatures and our reputations behind us."

Such were the glory days of Alberta big oil and gas. But the eagerness of private investors to sink cold, hard cash into extraction in Canada's west has been drying up, says Couillard. Oil prices have waxed and

waned over the past year—from \$75 a barrel back in August 2006 down to almost \$50 last January, then back to the \$70 range this summer—and investor interest has subsequently fluctuated, as well.

Indeed, modern-day explorers like Couillard have been forced to cut back drilling operations despite a worldwide demand that continually expands. Thanks to an expensive labour market, a supply ever-growing in its remoteness and a series of warm winters, new projects in Canada's energy alley have slowed to a crawl.

"Quite frankly, the amount of activity going on right now is about 50 per cent from even a year ago," he says flatly. "So there's a lot of angst out here as far as the conventional players."

Couple that with continuing international upheaval in energy hotspots, and the stage is set for a perceived energy shortage—not to mention those annoyingly high prices at the gas pumps. At the same time green, renewable energy sources are taking root across the country, and the world.

Bruce Doern, MA/66, director, Carleton Research Unit on Innovation, Science and Environment (CRUISE), says there are two distinct reasons for rapidly ascending world energy demand. "There's a more serious demand crunch than the last time the world got worried about energy in the '70s, largely because you have to add China and India into the equation," says the School of Public Policy and Administration professor and editor of 2004's *Canadian Energy Policy and the Struggle for Sustainable Development*. "Though I'm not sure I'd call it a

crisis in the sense that it's happening somewhat more gradually and people are aware of it."

"But the places where there is new supply are more remote, more difficult to get at and more difficult to extract," he says from his office at the University of Exeter in the United Kingdom. Oilfields and gas deposits in the Arctic are remote and carry huge environmental and transportation costs, Doern continues. Much of the easy-to-reach light sweet crude oil in Canada's west has already been found and tapped, leaving deep natural gas pockets and sopping pockets of oil sand in their wake.

These, while still extractable and profitable, come with higher price tags—as Escavar's founder can attest. "When we raised our dollars thinking we could get X number of prospects drilled, in fact we got about point-five of X done," recalls Couillard. "Every well we went out to do ended up costing 50 to 75 per cent more than we anticipated."

The economics just aren't there, he concludes. Add to that a general shortage in North American refining capacity—there hasn't been a new refinery built in decades—and it's no wonder the oil and gas industry is somewhat on the defensive of late.

"That's why if you look on the books as to the last 10 years, you can count on your hand the number of significant conventional oil discoveries," he says.

Don't get Couillard wrong, however. He concedes his industry will continue leading Canadian energy production throughout the 21st century, despite recent advances in renewable energy

sources and so-called "clean coal" technologies. Tim Krywulak, PhD/05, lecturer in Carleton's Department of History and author of 2007's *Fuelling Progress: One Hundred Years of the Canadian Gas Association*, agrees.

"North America has remaining gas resources that are about 80 times the current annual consumption," he says. "And if you project into the future that could last 100 or 120 years, depending on efficiency gains, technology and other sources of fuel that are developed."

Those numbers are largely dependent on new discoveries, Krywulak explains. Still, he says Canada produces twice as much natural gas as it uses. "Proven reserve ratios are constant at about nine times over consumption for the last 15 years."

"So it would seem that things like natural gas and even nuclear power still have a big role to play in the immediate future," he says.

Canada's gas reserves are huge. We're the third-largest exporter of the stuff in the world, producing around 6.2 trillion cubic feet annually. Almost 4 trillion of that is exported to the U.S., according to the Canadian Association of Petroleum Producers.

But much of it, Krywulak says, is burned right here in Canada; with large reserves ultimately comes big-time dependence. Natural gas accounted for 44 per cent of Canada's energy production for 2006, compared to 34 per cent crude oil. Primary electricity like hydro and nuclear, coal and other sources make up the rest.

Ironically, Krywulak says despite fears of a looming energy shortage—spurred by incidents like the 2003 blackout, theories of peak oil and soaring summer gasoline costs—there's actually a relative glut of oil and gas on the market.

It's a sentiment shared by Couillard. "Because of the excessive drill-

ing that took place during the high price regime, we're now sitting with gas in storage," he says. In 2001 alone, the province of Saskatchewan drilled around 1,500 natural gas wells—an all-time record. "So we're going to go into this winter with more gas in storage than we've ever had. If we have another warm winter, we're not going to get that gas out of storage and prices will stay suppressed."

That's having an effect on the way oil and gas is extracted, says Brent Hamilton, BA/96. Hamilton, owner and operator of Inglis Environmental, a consulting firm specializing in compost technologies and remediation of hydrocarbon contaminated soils, says environmental practices seem to have slipped recently.

"There seems to be an ebb and flow in the industry, in terms of environmentalism," he says. Inglis treats contaminated soil at drilling and oil sands sites so they can be safely disposed, a process not unlike brownfield site treatment in industrial areas of Canada's cities.

"A few years ago there was a lot of interest in doing things in an environmentally friendly way, and much of the cleanup was going well," continues Hamilton. "And that was because of a

willingness of the oil companies to do that work."

That's dropped off dramatically, he says. "I'm not sure why, other than pure economics. If the money isn't there to support the cleanup side of things, then that whole sector seems to fall off the radar."

Despite the somewhat gloomy outlook, there's no shortage of private companies and energy trusts combing the countryside for new deposits. One of those companies is Calgary's PrimeWest Energy Trust, which hunts energy throughout western Canada's sedimentary basin and Montana, North Dakota and Wyoming in the United States.

Tim Granger, BEng/80, the company's chief operating officer, says Alberta's high oil and gas revenues over the past decade did more than spur furious rounds of drilling. They also fuelled the cultivation of previously unthinkable sources, he continues, adding a prime example is Alberta's sprawling, mucky oil sands.

They consist mostly of heavy oil and bitumen, which require a much more energy- and greenhouse gas-intensive extraction process. "That's a resource that's always been there," he says. "The only real change is the price of those commodities has risen. We've gone from \$20 oil in the 1980s to \$70 oil, so now you can economically harvest those reserves."

"There's no less oil going around than back in the '80s, when it was \$20 a barrel," he insists—but he also acknowledges that the writing is on the wall for the fossil fuel industry, be it in the next two or two hundred decades.

"By nature, all natural resources are depleting," he says frankly. "I work in the oil and gas industry. But I acknowledge I work in an industry that's depleting, and that at some point the end has to come."

"So the world needs to find renewable sources of energy."

Cue Canada's still-tiny but increasing investment in green energy sources, a sector some think might rival oil and gas in the not-too-distant future. Technologies and fuels like methane capturing and gasification at landfills, wind farms, solar, ethanol and bio-fuel—not to mention more sustainable construction and auto-manufacturing practices—have all gained substantial ground in recent years.



Rich Couillard, BScHons/72

GETTING YOUR ENERGY FROM THE GROUND UP

Want to get yourself off the energy grid? A variety of technologies utilizing the earth's natural heating and cooling properties are available to consumers, for a somewhat hefty initial price tag.

Systems like geothermal heat pumps utilize metallic coils in the ground (similar to those at the back of an old-school refrigerator) to harness

the earth's heat in the winter and its coolness in the summer.

The Earth Energy Society of Canada estimates these systems cost between \$5,000 and \$20,000 to install, depending on the type. Operating costs, however, are estimated at as low as \$850 for the year—meaning the system pays for itself in as little as five years.



LOOK TO THE EAST

Western Canada and the Arctic aren't the only parts of Canada swimming in oil and gas—Canada's east coast, as well, holds significant offshore reserves.

Newfoundland and Labrador, in particular, holds viscous riches beneath its crust having last August struck a deal to develop a \$5-billion Hebron offshore oil project. It'll follow in the footsteps of the famed Hibernia oil field, which was developed in 1997 and sits just off the Grand Banks. It produces around 314,000 barrels of light crude oil a day.

According to Petroleum Research Atlantic Canada, Newfoundland in 2005 accounted for 12 per cent of Canada's crude oil production.

Alberta even has its own wind farms: at Pincher Creek there are approximately 300 wind turbines—each turbine can produce enough energy to power around 500 households.

But Doern says don't bust your lime-green track suit out just yet. Sustainables still have a long way to go, especially in energy-hungry Canada. "In terms of sheer, raw power, it's still going to be big oil and gas that have the biggest source of supply. And they're going to call most of the shots," he says.

"Governments have to be in a position to start favouring these new energy sources, and I think that's started to happen," he continues. That's happened more in the last couple years than in the last 10 put together, he says, thanks to pressure from an increasingly environmentally savvy public. "But it's still only a tiny, tiny percentage of our sources."

Krywulak agrees, adding that governments and the private sector need to harness that public sentiment and translate it to action. They can influence how people live, he says, and choices they make. "We have to get down to the way people live their lives every day,

because that's something that's resistant to change I think," he says.

"And yet we have to change some of these things."

Meanwhile, Couillard says he's not worried about the apparent lull in his province's main industry. The sector is cyclical, he says. Once prices and production costs adjust, he predicts Canada's prairies—and indeed, its Arctic—will once again feel the boundless energy of new drilling projects.

The world's demand for energy, he says, is too insatiable. "What I would suggest is the price of oil is what it is, and it's because we have a third of the world's population coming of age in India and China," he says, echoing Doern. "And the growth of their industry and middle classes is there, and it's insatiable."

"There's lots of productive capacity," he continues. "And after all, they always say the best solution for low gas prices is low gas prices." ■

Jim Donnelly, MJ/04, writes primarily for the Ottawa City Journal, Orleans Star/Weekly Journal, and the Ottawa Business Journal.

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TIME TO CUT



THE CORD?

CONSUMING ENERGY TO THE POINT OF CRISIS

BY KRIS FOSTER

In 2003, six major energy blackouts affected different parts of the world—all within months of each other. North America was certainly not immune. The Northeast Blackout of August 2003 was the largest in North American history—10 million people were affected in Ontario and another 40 million in the United States. We dropped off the grid.

Satellite images of the affected areas revealed a blanket of darkness.

The official analysis released by Canadian and American governments revealed that more than 508 generating units at 265 power plants—including 22 nuclear plants—shut down. A report, released by the U.S.-Canada Power System Outage Task Force, outlined the main cause: a generating plant in Ohio went offline during a period of high energy demand; the plant later went out of service when high-voltage lines came in contact with “overgrown trees,” causing a chain reaction.

Power was restored and life returned to normal—once we moved past the estimated financial losses in the \$6-billion range, and forgot about the inconvenience of life without power. But soothsayers started to line the streets with proclamations of the end: an energy crisis was upon us and life as we know it was coming to an end. Our brains, stuffed with Hollywood

imagery, began looking for signs of a biblical-sized energy apocalypse.

“People started to wonder if we were going to run out of non-renewable energy resources. That’s something people didn’t think about too often prior to a few years ago,” says Ian Beausoleil-Morrison, associate professor, Mechanical and Aerospace Engineering and Canada Research Chair in Modeling and Simulation of Innovative Energy Systems for Residential Buildings at Carleton University.

So, are the soothsayers right? Are we headed to a crisis? The answer: it depends.

“I think our society defines an energy crisis as the inability to deliver physical supply to match demand. The blackouts in the eastern United States and Ontario a few years ago, that was a crisis,” explains Brian Frank, BA/80, MA/82, president, BP Energy Company and North American Gas and Power. “When hurricanes Rita and Katrina went through the Gulf Coast within a month of each other, damaging the energy infrastructure and creating massive supply disruptions, that was a crisis. Unfortunately, we don’t define a crisis unless we have the inability to provide physical supply to the end-use customer and the price mechanism can not be used to clear the markets—we have only seen

that on a couple of occasions.”

A QUESTION OF CRISIS

“A simplistic definition of an energy crisis would be a shortage of supply of energy sources that we rely upon to maintain our standard of living, not just a one- or two-day fluctuation in energy supply, but for an ongoing period of time,” explains Beausoleil-Morrison. “I would say we are definitely not in an energy crisis by this definition because there is an abundance of conventional and cheap energy.”

Roland George, MA/79, board member of the National Energy Board, agrees, but suggests looking at a number of factors to determine the answer to the energy crisis debate. George’s list includes: rising energy prices; international conflicts and geo-political tensions; the apparent peaking of conventional energy resources in the world; strain on land use and infrastructure; negative environmental impact; and the ever-increasing global energy demands due to the pace of growth.

“Looking into the future,” says George, “those are pretty heavy tendencies; those are tendencies that you can probably count on to be around for quite a while. But in terms of the availability of energy sources in the future, from everything we look at, supply is



not expected to be an issue for a long, long time. We have a huge amount of potential energy sources."

No one denies that the Earth is a finite resource. Everyone agrees that our current level of demand and consumption will eventually deplete conventional and cheap energy sources from our Earth. It's just that this won't happen for centuries.

"I recognize that we all live in the short term and that the future is the future," says George. "But is this something you should be scared about or dramatically concerned about? I'd say no. Is it something that is unfortunate? I'd say yes."

THE ANATOMY OF A CRISIS

"I can't say that we have an energy crisis, because we have resources that are sufficient to last for a long time. But, I do think it is important to talk about whether we have an energy crisis or not," says Frank. "I think the signals that suggest that we do are that supply and infrastructure are extremely tight; down the entire value chain from the source of production, to the end-use consumer in virtually every commodity."

Consider, for example, a natural disaster like a hurricane that disrupts some refining and production capacity. "All of a sudden prices take off because the infrastructure is so tight. Historically there was a lot of slack in the system, especially in the '80s and

'90s. But there hasn't been a refinery built in the United States in the last 25 years. At the same time about 150 of them have shut down," says Frank. "Over the last seven or eight years there has been a growing realization that there is no slack in the system and when something falls over, there are immediate consequences in price."

We are all familiar with the price consequences—the higher prices at gas pumps when filling our vehicles or the incremental increases in the cost to heat and cool our homes. Basically, the economy determines the value for a commodity: when supply is tight, the market adjusts and prices go up,



Brian Frank, BA/80, MA/82

when supply is more abundant than demand, prices go down.

"It is a basic human reaction to not want to pay more than we have grown accustomed to paying for something, but circumstances are changing," explains George. "The world economies are growing for two reasons: population is growing and productivity is in-

creasing—this increased demand puts a strain on all natural resources and affects price."

For the average consumer, these rapidly increasing prices often give rise to shock, outrage and concern about maintaining an accustomed standard of living. Inevitably, though, being creatures living in a monetary world, most of us fixate on price. And given time, the higher prices become acceptable as standard and maybe even reasonable. In the end, these increases in energy price aren't too dramatic—they are more likely to cause annoyance rather than panic.

"We spend less of our disposable income on energy today than we did in the '70s when we said we had an energy crisis. The primary reason for that is, yes energy costs are up, but so is disposable income," says Frank. "The wealth in industrialized nations is at a point where people don't even pay attention to utility bills. When you know you need a tank of gas a slight increase isn't a deterrent. I think it is very much a cultural issue in a society where we have a sense of entitlement."

Take a close look at the urban sprawl. Houses are getting bigger and so are the cars. It is no surprise that standard of living and energy consumption are directly related. On a per capita basis, Canada is one of the leading consumers of energy in the world.

"I hear people screaming about expensive gasoline, but people are still driving Hummers and Suburbans—we haven't seen energy prices get to the level where people are going to fundamentally change their consumption behaviours and that's what I think needs to happen," says Frank. "The interesting thing that is happening now is that environmental policy is starting to move into the area of energy policy—one could argue that the environmental costs of using energy, especially fossil fuels, have never been reflected in the end-use price."

"It is hard to speculate as to why we don't appreciate the environmental costs of our energy consumption, but I think a lot of us are driven by greed as part of our make up," theorizes Beausoleil-Morrison. "We are a culture of convenience, habit and status."

So, if the question is not will there be energy in the future, perhaps it is

CANADA'S ENERGY USE

Total Energy Use (in petajoules PJ)	1990	2000	2001	2002	2003	2004
	6,950.8	8,096.7	7,889.9	8,194.6	8,439.8	8,543.3
Energy Use by Energy Source (PJ)						
Electricity	1,550.1	1,799.1	1,797.2	1,855.0	1,876.8	1,889.1
Natural Gas	1,777.6	2,127.8	1,961.9	2,111.0	2,193.2	2,178.9
Motor Gasoline	1,176.5	1,341.8	1,358.4	1,386.0	1,408.0	1,434.8
Oil	1,201.2	1,346.4	1,328.5	1,295.3	1,411.0	1,456.7
Aviation Gasoline	5.5	3.4	3.5	3.5	3.2	2.9
Aviation Turbo Fuel	181.9	235.9	215.1	224.6	222.5	246.2
Still Gas and Petroleum Coke	321.7	341.4	378.8	443.1	437.0	415.1
Wood Waste and Pulping Liquor	341.0	464.4	421.1	458.6	468.0	476.4
Other	310.0	334.5	329.8	316.6	314.5	335.5
Residential Wood	85.3	102.0	95.5	101.0	105.7	107.7

"Oil" includes diesel fuel oil, light fuel oil, kerosene and heavy fuel oil.

Source: Natural Resources Canada



Roland George, MA/79

how much damage are we causing to the environment by continuing to follow our tried, tested and true energy consumption path?

CONCERNING CONSUMPTION

"The current path we are on is not sustainable. That means that within the next generation or two, cheap fossil fuel sources are not going to be available," says Beausoleil-Morrison. "A lot of the interest today is because prices have risen and we see an increase in world consumption. But I think people are now starting to realize that all forms of energy consumption have some kind of adverse environmental impact—people are now making that connection."

It's tough to point fingers when it comes to the environment and not be a hypocrite. It's not a new realization that we are harming the environment—greenhouse gases, global warming, air pollution, toxic release, impacts on water, habitat and species, etc.—and it's not a new realization that we need to do something about it. We all talk to friends, family, neighbours and coworkers about being environmentally sound, but putting awareness into action is the important step that's missing.

According to Beausoleil-Morrison it comes down to education and economics. "If you look at home heating, about 50 per cent of Canadian houses have mid-efficiency gas furnaces in them. A lot of people don't know that if you replaced those with a high-efficiency condensing gas furnace you could reduce gas consumption by about 15 per cent in just one move."

This one move will cost about \$4,000

in upfront costs, with a payback period that runs between six and eight years. "A lot of people would consider it an economic decision," explains Beausoleil-Morrison. "If gas prices were more expensive, people would recognize this as a good investment and do it."

Beausoleil-Morrison sees environmental awareness, followed by economic action, as the catalysts to change behaviour. "Eventually we will come to a collective agreement that we should be reducing our energy consumption. Then we will put in the economic instruments to make that happen—taxing fuels. I think that will eventually happen but it is going to be a gradual introduction. It would be political suicide for anyone to suddenly change the economic structure of energy."

George agrees that pricing is the perfect tool to curb our energy hunger—but there are limits to what price can do, especially in the short term. "Pricing mechanisms are not perfect in a very short time frame—price will produce change, but not necessarily as quickly as people want change," explains George. "There are externalities that the market pricing mechanisms have difficulty taking into account. An externality could be the quality of air, and what price do you put on that? If you can't put a price on it, a market signal isn't sent to conserve."

Positive steps are being made, however. "I think some environmental groups overreact when they look at statistics and see energy consumption going up and think that nothing is changing," says Beausoleil-Morrison. "We are moving in the right direction. Consider energy retro-fit houses; increased sales of condensing furnaces; compact florescent lighting; and wind and solar power being added to electricity grids, just to name a few."

Becoming aware that lifestyle choices have an environmental impact is a start. We might not be taking a lot of action just yet, but an increase in awareness will lead to more action down the road.

AT THE END OF THE ROAD

"On the consumption side there is a lot that needs to be done relating to con-

servation and efficiency," says Frank. "On the supply side there is a lot that needs to be done on developing non-conventional hydrocarbons—sources, such as oil sands, that can be more easily extracted with the development of technology—and renewable resources—wind, solar and geothermal, for example, which are becoming more economical because of technology. We are starting to do that. Non-conventional hydrocarbons are becoming large scale, but on the renewable side it's still on a pretty small scale."

Governments are now mandating that renewable resources are included in utility portfolios—directing utility companies to have a minimum percentage of renewable energy in the electricity supplied to customers.

"Probably less than one per cent of the total mix is renewable, but you have to start every journey with a first step," says Frank.

By mandating use of what are currently uneconomical resources in the utility portfolio, the development of technology is enhanced, too.

"With existing technologies we could easily cut our energy consumption in half without taking conservation measures, just efficiency improvements. I think what we really need to do is use less energy—then we can have the argument about how we are going to produce that energy," explains Beausoleil-Morrison. "We have to move to a culture of conservation, a culture that doesn't aspire to live in huge houses and drive big cars."

"Whatever moves we make we must consider the three Es—energy, economy and environment—because they are so interrelated," says George. ■



ENERGY FROM



WASTE

BY KRIS FOSTER

The cynic in all of us could easily identify two pillars of modern society: consuming energy and creating garbage. Our penchant for consumption and creation has put our world in a precarious position. Sometimes when we consume we create waste that stockpiles in landfills. Other times when we consume, as in electricity, natural resources and power, we just waste and create crisis.

Andreas Tsangaris, BEng/80, MEng/83, recognized the dire position we are moving towards and sought out an answer. The solution Tsangaris came up with? Garbage = Energy. For 26 years Tsangaris, in positions ranging from junior engineer to his current position as chief scientist, has worked with Plasco Energy Group to make this simplified equation a reality. —>



"This was my first and only job out of university. I am almost married to it," says Tsangaris, who started working at Plasco while completing his master's degree in mechanical engineering. "My university advisor introduced me to the founder of the company to see if I could do my thesis work on technology they were bringing to Canada—an offshoot of technology developed at NASA."

As a child growing up in Cyprus, Tsangaris always had an inclination towards mechanical things and numbers. Following family advice he decided to study engineering at the University of Manchester. However, war broke out between Cyprus and Turkey, and the Tsangaris family lost everything—money, property, the family business and the means of paying for a university education in Britain.

"My only chance was to receive financial aid so I applied to a scholarship fund of the commonwealth," recalls Tsangaris. "I was lucky enough to be chosen to get one of the scholarships in Canada. Some 30 years later I still have the brochure from which I learned about Ottawa and Carleton University."

Fast-forward to present day and the education Tsangaris received at Carleton is helping solve energy and waste problems. Through 26 years of plasma research at Plasco, Tsangaris helped develop the process and equipment to convert waste into energy. "We take waste material that



would normally go to a landfill, and cause ground and air contamination, and convert it into clean electricity."

The process, not to be confused with incineration, uses plasma, a hot ionized gas that promotes reaction when applied to a substance—in this case garbage. According to Tsangaris almost any waste material can be used in this process, although substances that have high heavy metal content are not as preferable.

"This process is different from incineration as there is no burning. We see it as reorganization at an elemental level," explains Tsangaris. "In

plasma conversion the waste is converted by high temperature into its constituent elements such as hydrogen, oxygen, carbon and nitrogen." The process controls conditions so that these elements reform into synthetic gas, or syngas. Syngas, along with steam, which is another byproduct of the process, are then used to create electricity by running engines and steam turbines. This electricity can then be supplied to the grid for consumer consumption.

The other main byproduct of this process is what Tsangaris calls slag. "Slag is a solid byproduct of the conversion process," says Tsangaris. "When cooled it becomes a clean, glass-like substance that is used mainly as an aggregate for making concrete or asphalt."

"I love my work," says Tsangaris. "Most important is that our research concurrently addresses three of the most critical issues facing our planet: electricity generation, environmental sustainability and waste disposal. We have not only made waste disappear and produced electricity in an environmentally friendly manner, but we have saved fossil fuel reserves and decreased greenhouse gases."

"This will not be a complete replacement for our reliance on non-renewable resources," Tsangaris points out. "But it will supplement our consumption and decrease the use of fossil fuels. We still have to work towards decreasing our energy consumption habits." ■



THE ENERGY OF WASTE

Plasco Energy Group completed the construction of its Ottawa facility in summer 2007. The facility has the capacity to convert 85 tonnes of municipal solid waste (MSW) into four megawatts of electricity to the grid every day—enough electricity to power the entire process and approximately 3,600 Ottawa households.

Every tonne of MSW processed creates:

- 150 kilograms of saleable solid residue (slag), which can be used as construction aggregate;

- 1,400 kilowatt hours of electricity in combined cycle mode—enough electricity to run a home for 55 days; and
- 5 kilograms of saleable sulphur.

Plasco also operates a plasma conversion facility in Castellgali, Spain. This five-tonne per day research and development facility has provided the resources to optimize the design and operation parameters of the reactor and control system in use at the Ottawa facility.

Source: Plasco Energy Group



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Turning *tides*

BY JAMES HALE

When food shortages, not the environment, appeared to be the main threat to our future, many scientists told us to look to the oceans for sustenance. Now, with renewable, environment-friendly energy our primary concern, Justin Blanchfield, BEng/04, is also pointing the way to the sea. As a member of the Institute for Integrated Energy Systems at the University of Victoria, he is conducting research on how to efficiently extract energy from natural tidal activity.

"Ocean tides hold the promise of a very predictable source of energy," he says. "Because they are controlled by the positions of the sun and moon they are much more predictable than wind or solar power. They're also very site specific, so we know where to find the best sources of tidal energy."

The energy potential exists in both the ebb and flow of tides, and that potential is greatest where the velocity of the tidal water is high because it is channeled through narrow openings in bays or between landmasses. Canada has several significant sites of large tidal activity, including the Bay of Fundy, which boasts the world's highest tides, and the Queen Charlotte Islands (Haida Gwaii), the site of Blanchfield's research.

Extracting the energy from tidal activity requires submerged turbines, a technology that Blanchfield says has developed significantly over the past five years. Although no commercial units are in operation, a number of test sites exist around the world.

The challenge that Blanchfield is working to overcome is to prove, through numerical modelling, that tidal energy can be consistent enough to be integrated into the traditional electrical grid.

"The limitation of most renewable energy sources is that they fluctuate, so as long as there is an abundant, constant supply of coal, there's no incentive to switch."

"One advantage of the situation in Haida Gwaii is that the area is heavily dependent on imported diesel fuel for power generation. If we can show that tidal energy can be provided on a consistent basis, it will be seen as a viable alternative."

A passionate mountain biker and outdoor enthusiast, Blanchfield has a natural affinity for environmental issues—a relationship that proved an ideal fit with his work on fuel cells in his fourth year at Carleton. He is a pragmatist about the global outlook on the environment.

"I mean, first you have the question of if it's even a problem that humans are causing. We haven't moved past that yet, and it's going to require extraordinary effort to shift us away from this huge coal resource we rely on. Europe is much further ahead than us in North America, and it's going to take either serious political pressure or entrepre-

neurs to get us to move."

Without political determination, there has to be a commercial imperative. Blanchfield's first area of research—fuel cells—provides a concrete example of the problem.

"Even after years of research, fuel cells are not cost efficient. There's no major commercial application yet, and it's clear now that it won't be automobiles."

That said, he points to fuel cell pioneer Geoffrey Ballard's continuing work as an example of the type of entrepreneurship that's needed.

"Ballard's now doing work experimenting with forklifts as a possible niche application for his technology with fueling stations located in warehouses as a practical and economical solution."



Ocean tides could prove to be a viable source of energy in the future.

Given his view that the answer to making real progress on air quality issues doesn't lie in the laboratory alone, it's no surprise that Blanchfield is anxious to move into industry when his master's degree of applied science in mechanical engineering is completed this year.

"I want to get my hands dirty with engineering projects. The field of power generation is exciting, and there are lots of large-scale problems that need to be solved."

After dodging the question once on whether he's optimistic or pessimistic about our environmental future, he allows that the situation with air quality is "pretty bleak."

"Taking carbon out of the atmosphere represents a huge problem. I don't think (Sir Richard) Branson's approach is going to be the answer. We have to tackle the issue of reducing air pollution, and hopefully the current interest in issues like alternative forms of renewable energy isn't just a fad." ■

James Hale, BA/77, is an Ottawa-based writer and editor.



According to Justin Blanchfield, BEng/04, ocean tides could be a predictable source of energy. "Because they are controlled by the positions of the sun and moon they are more predictable than wind or solar power."

PULL UP A CHAIR

For really good stories, the tales that need to be told, taught and remembered, you grab a chair and listen. These are the stories of William Barton and Ruth Bell—two long-time Carleton donors whose recent generosity enabled Carleton University to establish two Chairs in the Faculty of Public Affairs (one in the Norman Paterson School of International Affairs and one in the Department of Political Science). Sit back and enjoy.



BY KRIS FOSTER

WILLIAM BARTON

Vienna, Geneva and New York were just a few of the stops William Barton made during his distinguished 30-year career as a Canadian diplomat. Barton held positions as diverse as Canada's ambassador to the United Nations, president of the UN Security Council, and chair of the Conference of the Committee on Disarmament (CCD). The CCD, which later became known as The Barton Group, was a major clearing house for issues and views on disarmament among Western countries.

"I retired in 1980, but continued my involvement in international affairs as a consultant," says the 89-year old Barton. In his consultancy role, Barton drew on his experience as a diplomat on the world stage and helped establish the Canadian Institute for International Peace and Security, for which he served as chairman from 1984 to 1989.

"I guess you never really retire when you're passionate about something," reflects Barton, who received the Order of Canada in 1994 for his diplomatic role in enhancing Canada's position and stature internationally.

With the establishment of the William and Jeanie Barton Chair in International Affairs, it is clear that Barton still hasn't retired from working to improve the state of the world's politics.

"I think Carleton does a very good job at addressing the areas of international affairs, but more can always be done," says Barton. "I thought my donation to establish this Chair would help future generations of NPSIA students succeed on the international stage."

"Ethnicity, religion and economics have always been the big three reasons for conflict in the world and they probably always will—I am not sure we will see peace in our time," explains Barton. "But moving towards peace and harmony for our world and all of the people living it, that's an important area of study."

"A young student going through international affairs education should have an open mind, but also a critical mind," Barton advises. "You have to be able to express your thoughts well and be prepared to stand up for them, but when your boss says that's it, you have to accept it and move on. That's life in the public service."

RUTH M. BELL

Behold the turtle: she makes progress only when she sticks her neck out. Those are words that Ruth Bell, MA/65, LLD/84,

takes to heart. Bell stuck her neck out when she pursued her first degree through five universities, three countries, two continents and 10 years. "Getting my first degree was so important to me," says Bell. "For me, higher education and training is essential—it opens new vistas, and presents you with opportunity. Education presents you with a whole new world to enjoy."

For six decades Bell has stuck to this motto and continued sticking her neck out in order to be an ardent supporter of many causes in the world—particularly women's rights and education. Bell, now in her late-eighties, was one of the initial members of the National Action Committee on the Status of Women, and was a founder of both the Canadian Commission for Learning Opportunities for Women and the Canadian Research Institute for the Advancement of Women. In recognition of her tireless efforts for the advancement of women's rights, Bell received the Governor General's Person Award and, more recently, the Award for Lifetime Achievement from the YMCA-YWCA Women of Distinction. Bell also received the Order of Canada in 1981.

In the area of education, Bell enjoyed an illustrious career as a professor at Carleton University. "When I was teaching I felt that students weren't learning as much about Canadian government, politics or history as they should be," explains Bell. "I think people need to know about their own country—it is essential to being a good citizen. It is something my late husband Dick and I often talked about."

"Dick was one of the most distinguished men we ever had in parliament—a very well informed man, not only a politician, but a lawyer of great distinction, too. He was always interested in the education of young people and that they learn about Canadian government," explains Bell. "I wanted to establish the Honourable Dick and Ruth Bell Chair for the Study of Canadian Parliamentary Democracy to honour my husband's distinguished career, a career that should be remembered."

Bell also hopes that the Chair will develop plans and programs for exploring and extending the knowledge of Canadians on our history, government and political system. "Without knowledge of our own history, we might not appreciate the strides we have made and realize how good we have it today," she explains.

"What better place to have a chair in this subject than the nation's capital? It will help to attract, not only students, but academics, politicians and journalists as well." ■

THE WILLIAM AND JEANIE BARTON CHAIR IN INTERNATIONAL AFFAIRS

The Chair will support teaching, research and public education to promote understanding of Canada's roles and impact, both past and present, in international diplomacy. The Chair will initiate new courses, colloquia, lectures and public conferences to disseminate the knowledge in this subject in Canada and internationally.

THE HONOURABLE DICK AND RUTH BELL CHAIR FOR THE STUDY OF CANADIAN PARLIAMENTARY DEMOCRACY

The Chair will support teaching, research and public education into Canada's dynamic and ever-changing system of parliamentary democracy. The Chair will initiate new courses, colloquia and conferences to promote understanding of the Canadian parliamentary system. The Chair will enrich the lives of Canadians by challenging them to engage in and contribute to our nation's parliamentary model.

A man with glasses, wearing a light blue shirt and a dark tie, stands with his arms crossed in a control room. The room is filled with industrial equipment, including large pipes, valves, and several pressure gauges. The background is a mix of dark and bright colors, with a prominent red wall on the right. The overall atmosphere is professional and technical.

The power of education

BY ALEX WOOLEY

George Corluka, manager of Technical Services, and his staff of about 30 technicians and steam plant operators keep the energy flowing at Carleton University.

"Users don't even notice our presence—at least when everything is going right," says Corluka.

In energy consumption terms, Carleton is like an Alberta oil town: it's boom time. As the student population grows, and new buildings populate the campus, energy needs increase. Alone, the electricity used could light close to 30,000 homes.

According to George Corluka, Carleton's manager of Technical Services, over the past three years the amount of space needing to be heated or cooled, depending on the season, has increased by almost eight per cent to close to 3,600,000 square feet. Natural gas and electricity consumption has gone up by more than 11 per cent. The rise in energy prices has not helped either; Carleton's water bills have increased by 35 per cent in recent years. Together, electricity, gas and water bills total more than \$10 million annually.

Besides the expense, the university, faculty, staff and students have an environmental responsibility to reduce consumption. The university has taken steps big and small to cut consumption. All energy flows are measured and in most instances controlled, including measuring voltage fluctuations so that less is paid per kWh. "Measuring it makes us aware of saving opportunities and we do save wherever we can," says Corluka.

"The single most important thing that individuals can do is switch off their computers and printers at the end of the day," says Corluka. "The next best thing would be for people to get rid of their portable heaters and fans—each one of these devices costs us about \$30 per year in electricity costs."

"The major component of sustainability is energy reduction," says Corluka. "If we can find economic ways to reduce energy use, we do it."

Darryl Boyce, assistant vice-president (facilities management and planning) and Corluka have also made it a requirement that all new motors and equipment be EnerGuide approved, and most campus lighting has been changed to T8, with energy-saving approved lamps and ballasts—incandescent light bulbs are now a thing of the past.

Readers might be hard-pressed to recall where the campus's central heating plant, home to three massive steam boilers, is located. Hint: it is a large open-space facility where there is a near-constant din—and it's not Oliver's.

Similarly, most of us tread unaware over the hundreds of kilometers of power cables, control cables, water pipes, steam and condensate piping and natural gas piping running underground or through service tunnels, criss-crossing the campus. Or the staff of some 30 technicians and steam plant operators that keep the heat and water flowing. "Users don't even notice our presence—at least when everything is going right," notes Corluka. ■

Alex Wooley, BA/89, is the director of communications and development at Intermedia in Washington, DC.

Fast Facts

- The athletics complex is the single largest energy consumer of all buildings on campus. "The lighting needs some additional automation and the cooling system needs some modifications to reduce energy use," explains Corluka. "We are presently working on these issues and are confident that the athletics complex will use about 10 per cent less energy this year versus last year."
- Carleton's central heating plant includes three "D" type water-tube boilers, used for heating, hot water and humidification. The operation of the steam generation systems and the quality and quantity of steam supplied are controlled and operated 24 hours from the boiler control room located in the plant.
- There are two diesel-generator units in the plant which provide an alternative source during power outages.
- Campus consumption of electricity is about 67,000,000 kWh per year; and natural gas is about 98,000,000 equivalent kWh per year.
- There are more than 5,000 thermostats and room temperature sensors on campus.
- Most buildings on campus are controlled with a computer-based system referred to as a Building Automation System (BAS). The BAS optimizes room temperature while managing the amount of primary energy (natural gas and electricity) used to maintain that temperature.

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Adding fuel to the fire

BY AMANDA COSTEN

After his daughter miscarried three times, his cows died and his soil was poisoned, Wiebo Ludwig decided to attack the oil wells he blamed for causing his misfortune. In 2000, he was sentenced to 28 months in prison after being found guilty of five counts related to blowing up and vandalizing oil wells in Alberta's Peace River region.

Ludwig's crusade against the sour-gas flares used to burn off excess fumes from oil wells brought national attention to the pollution and negative health effects of the more than 5,000 such flares in Alberta and British Columbia.

Around the same time that Ludwig was shining a spotlight on the issue, PhD candidate Matthew Johnson was investigating the emissions, combustion processes and properties of gases relating to solution gas flares at the University of Alberta. When findings from the Flare Research Project showed that flares are inefficient in burning hydrocarbons at low heating values, the Province of Alberta adopted the researchers' recommendation to establish the lower limit for heating value as part of the Alberta Energy and Utilities Board Guide on Upstream Petroleum Industry Flaring. Research had changed the law, and Johnson got a taste of how he could make an impact.

Now the Canada Research Chair in Energy and Combustion Generated Air Emissions at Carleton, Johnson continues to seek ways to clean up the energy industry.

"Regulators can't make decisions without data, but there currently isn't a way to accurately measure and report on the emissions from gas flaring," says Johnson. "The particulate matter in emissions—the soot that comes out of the flares—causes health problems and has a role in global warming, but we don't yet know enough about it."

Although federal guidelines require

reporting of particulate matter emissions from industrial sources in the National Pollutant Release Inventory, there are currently no accepted protocols to meet this requirement for open sources such as flares.

Since flare performance is affected—and complicated—by crosswind, exit velocity, fuel composition and flare diameter, Johnson's research involves understanding the factors affecting emissions, developing mathematical models to improve flare efficiency and predict greenhouse gas emissions, quantify soot emissions, and develop new diagnostic tools.

Taking advantage of recent improvements in optical diagnostics and sensing techniques, Johnson is working on quantifying and mitigating combustion generated pollutant emissions. In collaboration with National Research Council Institute for Chemical Process and Environmental Technologies, Johnson's team is using innovative laser-based techniques to measure optical properties of soot and particulate matter, and develop new and practical ways to measure it. One promising new approach uses simple camera-based technology to look through plumes to directly measure particulate matter entering the air.

"Once we understand how soot forms and how to monitor it, then incentives can be introduced to manage it. Since we can't possibly replace fossil fuels in at least the next 25 years, we have to clean up the existing technologies," says Johnson.

Throughout the world, approximately 91 per cent of produced energy and 86 per cent of consumed energy is combustion derived. With current and planned expansion to oil sands production, this percentage seems likely to remain stable, if not increase—making Johnson's research critical to the future of cleaner combustible energy.

Johnson recently presented a green-

house gas emission model for flares to the World Bank at a conference in Paris. If adopted as part of a clean development mechanism protocol, the model—which provides a yearly average of the effectiveness of the flare in converting carbon in the burned fuel to carbon dioxide, and emissions of more potent greenhouse gases such as methane—would be a valuable tool for change.

"Like with carbon credit trading, there needs to be a value incentive for flares to be cleaned up," says Johnson. "Big economic decisions require data and an agreed upon protocol. My work gives them that information."

"We saw changes to stop acid rain and ozone depletion, now it's time to regulate emissions." ■

HUNTING FUGITIVE EMISSIONS

In a large, complex petroleum facility, miles of pipes, valves and fittings leak emissions such as methane, a greenhouse gas 23 times worse than carbon dioxide. These fugitive emissions are currently detected using handheld devices or infrared cameras in an expensive and time-consuming process.

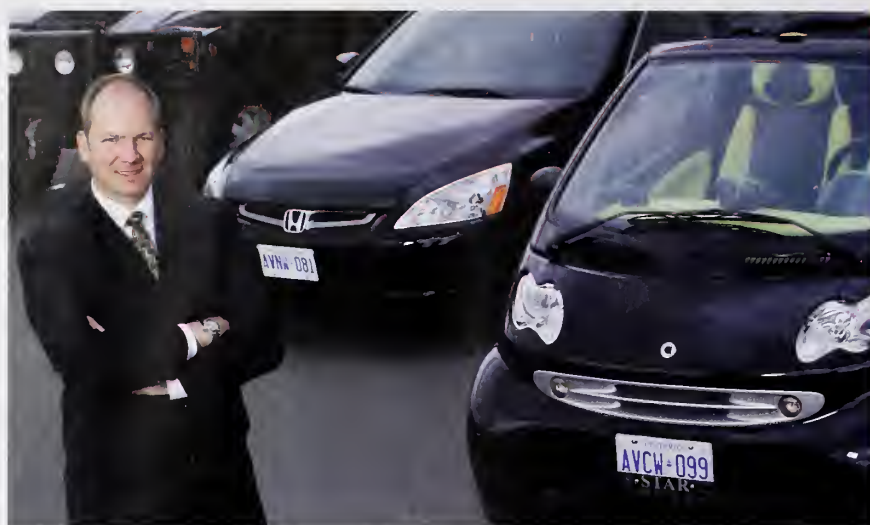
Matthew Johnson, assistant professor, and John Goldak, distinguished research professor, in the Department of Mechanical and Aerospace Engineering are investigating a novel, provisionally patented technology that can change the way fugitive emissions are detected.

In partnership with Environment Canada, the team plans to use a small number of detectors with a new modelling program to detect leaks in three-dimensional space. With a central processing hub, the system also has the potential for arm's length reporting.

"This is a known area of emissions that for economic reasons alone, companies want to reduce. Accurate detection will get rid of a source of pollution almost immediately," says Johnson.



Matthew Johnson's study of pollutant emissions has drawn the support of Environment Canada and the Canadian Association of Petroleum Producers, and has helped influence air quality regulation in Canada.



Wheeling and dealing BY ERIN SWEET

Jeff Mierins, Ottawa-based car dealer, is driving support towards Carleton's Department of Recreation and Athletics.

Car dealers are highly competitive when it comes to price and service. So it's no surprise that after learning of a colleague's donation to an Ontario university, the president of two Ottawa-area car dealerships decided to steer some of his fortune toward Carleton.

Jeff Mierins, BA/84, was certain he wanted to direct his donation to Carleton's Department of Recreation and Athletics.

Mierins wanted his contribution to reach as many recipients as possible. For Mierins, the best way to achieve this criterion was to support physical fitness.

"Sports are all encompassing," says Mierins adding that students across all disciplines can participate. It's not about jumping on the bandwagon to support the team on top.

"My goal is to support all sports," says the former varsity rowing team member. "I don't want to forget about fencing, water polo and varsity sports."

Mierins' donation, which will be distributed over five years and includes an award component, will go towards supporting Carleton's student athletes and sponsoring varsity athletics.

"I wanted to be able to spend wisely and feel good about it."

With a major in English and geography, Mierins' urban planning skills are serving him well in his professional career. As president of Dow Honda and Star Motors, Mierins has recently turned the sod on Ottawa's first green

automotive dealership.

The environmentally friendly dealership, which is set to open within a year, will feature smaller windows to reduce heat loss in the winter and heat gain in the summer. The garage area will be insulated with the same material that is used in aircrafts to reduce noise pollution and the dealership will lower its lighting levels by half of what's used by traditional dealerships.

The dealership will also experiment with solar heating. The side of the building that will face the highway will host a glass cube complete with signage. The heat gained from the solar cube will be collected and then deposited into other rooms in the building.

Mierins, the owner of a Honda Accord hybrid and a H1 Hummer that runs on biodiesel, is encouraged that consumers are becoming more environmentally conscious, so much so that he is currently sold out of hybrids. This heightened awareness may also challenge car dealers, says Mierins, whose family has been in the car industry for three generations.

"If our building saves 20 to 30 per cent of energy, others may be attracted to emulate it," says Mierins. ■

Erin Sweet, BJ/98, MJ/00, is a communications advisor with Human Resources and Social Development Canada in Ottawa.

A stroke of support

BY RYAN DAVIES

Under a sunny summer sky, golfers at the second annual President's Golf Tournament on August 27 raised an outstanding \$145,425 for student athletes at Carleton. The total—an increase over last year's proceeds—is another giant step towards the tournament's eventual goal of \$1 million.

Golfers representing various corporate partners of Carleton, including title sponsor Sodexo and hospitality sponsor Aramark, shot 18 holes at Stonebridge Golf and Country Club near Manotick, ON. The tournament was hosted by President and Vice-Chancellor *pro tempore* Samy Mahmoud, who was helped by many volunteer student athletes. *Globe and Mail* sportswriter David Naylor, BJ/90, served as master of ceremonies at a post-tournament dinner in the Ravens' Nest.

Proceeds from the tournament will go towards annual scholarships as well as to permanently increase the Ravens Fund endowment for varsity athletes. "We are delighted by the support our partners show for Carleton varsity athletes," said Ed Kane, assistant vice-president, University Services, and chair of the tournament planning committee. "They appreciate the chance to make an investment in our students—and it was a wonderful day for golf, too."

For the second consecutive year, a foursome from Thomas Fuller Construction shot the lowest score to claim the President's Cup trophy. The winning team's names will be engraved on the trophy and put on permanent display in a case along the Alumni Hall concourse. ■

Sporting a new title

Jennifer Brenning was appointed to the position of director of Recreation and Athletics. Brenning previously served as the associate director, Recreation and Athletics at Carleton.

Brenning says she was attracted to the position as Carleton University has a strong reputation for athletic excellence. "Athletics enhances the overall student experience and provides school pride, spirit and visibility for Carleton. I look forward to working with other departments on campus to support the university's mission and make Carleton's athletic department the best in the country." ■

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Class Acts

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Designed distinction

BY RICHARD MARTIN

Jennifer Luce, BArch/84, is this year's winner of the A.D. Dunton Alumni Award of Distinction for her contributions to the School of Architecture and its students.

"I felt that after 20 years of practice, I had lived up to the standards set by the school and had truly begun to explore the principles and learned process that were all mantras of my education," explains Luce. "The standards at Carleton are of the highest degree and I decided that I was ready to return with head held high."

Luce's contribution began in March 2006 when she was the invited lecturer for the Pit Lecture Series. Sheryl Boyle, BArch/90, assistant professor and coordinator of the series, says Luce contacted Marco Frascari, the director, to express her interest in doing something for the school.

Luce enjoyed her experience as a lecturer and wanted to look for ways to continue her involvement. At a brainstorming session with Boyle and Frascari, she came up with the idea of student internships.

The internship program started in June 2006. To date, three students have been invited to work in her internationally acclaimed office in San Diego, Luce et Studio, with support for travel and accommodation for a defined period. All applicants are given feedback on their portfolio for future improvements.

"For students, it's a special opportunity," Boyle says. "Luce et Studio does exceptional work—with materials and in getting the details right—and exposes the students to a

smorgasbord of ideas. Plus, the students find their projects are getting built. They're just glowing when they come back. Jennifer appreciates their freshness and imagination."

One of the three lucky interns, Joe Sauvé, BArch/04, MArch/07, agrees. "I have only wonderful things to say about Jenn. She's an inspiring mentor who takes the time to make great architecture. I was moved by her talent, curiosity and thoughtful design process. As an educator and professional she continues to inspire us."

Luce says the inspiration is mutual. "The quality of student work at Carleton is unparalleled and our desire to entertain interns is all about mutual inspiration, learning and influence. We gain as much from the energy of young, fresh minds as they do experiencing a studio in full throttle; not to mention the California sun and beaches!"

Another of the interns, Nancy Chao, BArch/04, MArch/07, says, "The internship opportunity that Jennifer has offered the students at Carleton has allowed me to gain the confidence and knowledge to pursue any future endeavors in my discipline." Chao has just accepted a full-time position with the studio.

As if all this weren't enough, Luce also came back to teach as the visiting critic in the grad students' studio from

CLASS NOTES

1940s

Louis Doherty, BSc/49, celebrated 50 years as a priest of the Passionist's Order on June 9, 2007, with a reception in Ottawa—organized by his nephew **Rod Ralph, BSc/71, BA/78**—that was attended by many classmates from St. Pat's class of 1949 including Pat Ryan, Pat Martin, Paul Hewitt, Lou Kavanaugh and Brian Higgerty.

1960s

George Scott, BJ/66, is an academic advisor to Seneca College's 2,800 international students in Toronto. He retired from teaching in 2005 where he was a professor of technical writing and communications at Seneca and the University of Guelph. He maintains Tech writer! a site with over 120 million hits internationally at ilearn.senecac.on.ca/techwrite.

David Eisenstadt, BJ/67, has been elected to his first term on the University of Calgary Senate.



Tom Schroeter, BScHons/69, retired from the BC Ministry of Energy, Mines and Petroleum Resources and became president, CEO and director of Fjordland Exploration Inc., based in Vancouver, on June 1, 2007.

1970s

John Aylen, BA/73, has joined Montreal-based AGC Communications as vice-president. The growing public relations and reputation management company has clients in the corporate, financial, IT& telecom, pharmaceutical & health care, real estate, packaged goods and fund raising sectors.

George Webber, BJ/74, received the Silver Award in Photojournalism & Photo Essay from the 30th Annual National Magazine Awards. George also received the Community Achievement Award for Arts from the City of Calgary.

William Sweet, BAHons/75, MA/79, has been appointed vice-president (academic) at St. Thomas University, Fredericton, NB. He also holds the academic rank of professor of philosophy and professor of religious studies.

John Dickie, BAHon/77, has been named Member of the Year by the Federation of Rental Housing Providers of Ontario for the second time in three years. A lawyer since 1983, John was honoured for his work on behalf of the rental housing industry as president of the Canadian Federation of Apartment Associations.

1980s

Paul Watson, BJ/82, a Pulitzer Prize-winning journalist, spoke at the Library and Archives Canada to promote his new memoir, *Where War Lives*. His 1994 Pulitzer-winning photo was reprinted around



Luce's thesis project—an exploration of an urban cemetery in Old Montreal—won a design competition in 1984. Luce had brought this project to Arquitectonica Architects in Miami, which hired her and built it in conjunction with the Center for Innovative Technology.

January to April 2007, making five or six return flights at her own expense. She also invited 11 grad students to spend more than a week at the studio. And in February 2007, she was the Carleton University Symposium keynote speaker.

"She can't sleep much," Boyle laughs. "I'm not sure how much more someone could contribute to the school."

For her part, Luce says, "The award touched me like no other accomplishment. Learning of the past recipients completely humbled me, but it was truly an honour to think that after all these years of working so far from home, home was acknowledging the perseverance it takes to take risks and to practise one's profession outside the realm of comfort."

Luce et Studio has just won the 2007 American Institute of Architects San Diego Honor Award. It's one of 20 awards the firm has received since its founding in 1990. Luce's work has been celebrated in the *New York Times*, the *LA Times*, the *Globe and Mail*, *Canadian Architect*, and *Progressive Architecture* among others.

Luce says that her much-honoured work is primarily about the people who inhabit the spaces she and her team design. "Our studio tells stories in the spaces of our work. We focus on people and the very intimate experience that they have with space; each client's life is integral to the architectural solution."

"I remember the morning that I arrived at my desk to find the e-mail from Carleton," Luce says. "I have never been so proud of my professional journey as to know that I was educated at Carleton. Carleton taught me to fear no challenge and I so respect this honour."

For more information and to see examples of the firm's work, visit lucestudio.com. ■

Richard Martin, BAHons/70, BJ/83, is an Ottawa-based writer.

the world. He's currently South Asia bureau chief for the Los Angeles Times.

Sylvia Pollard, BA/87, has launched the first song from her forthcoming CD on CBC Radio 3. To hear "Pink Lilies" visit radio3.cbc.ca.

Crispin Shaftoe, BAHons/88, was recently appointed professor of public policy at Niagara College. He teaches courses on government, history, religion and current issues.



Paul Gauthier, BA/89, recently completed his voluntary tour of duty in Afghanistan with the Canadian Armed Forces, Royal Canadian Regiment out of London, ON. He temporarily left his

Ontario Provincial Police job to volunteer his services in Afghanistan. His wife **Karen Boissonneault, BAHons/89**, and their two children, Marielle and Matthieu, are all extremely proud of him, and happy

to have him safely home.

1990s

Brian Bost, BCom/90, was named one of the Top Forty Under 40 by the *Ottawa Business Journal* in 2007.

Richard Stanton, BA/93, BA/96, was named one of the Top Forty Under 40 by the *Ottawa Business Journal* in 2007.

Kelly Sample, BCom/94, was named one of the Top Forty Under 40 by the *Ottawa Business Journal* in 2007.

Patrick Schwerdtfeger, BCom/94, won a public speaking competition sponsored by Toastmasters International—he now holds the title "2007 District 57 Table Topics Champion" and is looking forward to competing again in 2008. Patrick lives in the San Francisco Bay area where he originates mortgage loans.

Michael Barbour, BAHons/96, completed his PhD in instructional technology from the University of Georgia and has accepted a position as an assistant professor at Wayne State University.

Dean Tomlinson, BA/96, and Lisa Kojola, BA/98, celebrated five years of marriage in August 2007. They reside in Toronto.

Jennifer Barrigar, BAHons/97, is pursuing her LLD in the law and technology program at the University of Ottawa. Previously, Jennifer served as legal counsel for the Office of the Privacy Commissioner of Canada.

Johnathon Chapman, BCS/97, recently moved to Doha, Qatar, where he is chief information officer for Georgetown University's School of Foreign Service in Qatar.

Kenneth Chang, BEng/98, has moved into a position as a technology leader in Cadence Design Systems in San Jose, CA.

Lindsay (Gammon) Hulkkonen, BA/99, recently opened bump maternity + baby, selling designer maternity clothes, nursing wear and organic children's items, diapers and bedding.

Katherine Reyes, BJ/99, works as a civil affairs officer for the United Nations Mission to Sudan. She may be reached at reyesk@un.org.

Living off the grid

BY AMANDA COSTEN

This past spring, Les MacDonald, MA/74, PhD/85, and Gwen Hoover planted their roof. It's not for lack of gardening space.

The couple's 10-acre property of meadow, wildflowers and trees on the shore of the Bay of Quinte in Prince Edward County, ON, provides all the vegetation they desire.

By adding six inches of soil on top of a membrane on the roof and planting it with sedum, a low-growing, drought-resistant succulent, the couple created a natural air conditioner in the summer, that also provides extra insulation in the winter. Installing their "air conditioner" was the last major project to complete their off-grid, eco-friendly home.

The journey for the former Ottawa cultural bureaucrats from downtown Ottawa to down by the shore began over three years ago. MacDonald retired as director of Strategic Programs and Joint Initiatives at the Social Science and Humanities Research Council, where he'd worked since the 1970s. Hoover left her position with the Public Lending Right Commission, and they "moved south" where they could pursue sailing and MacDonald could resume astronomy.

"When we lived in the city, the infrastructure conspired against conservation. Power wasn't individually metered in our condominium, for example, so we had a good excuse for doing little for the environment," says MacDonald. "In building our retirement home, we had the opportunity to control the variables. We wanted to build a comfortable, aesthetically pleasing home that was environmentally responsible."

Just how environmentally responsible the house would be came as a bit of a surprise.

With the chosen building site 500 meters from the road—and the hydro lines—the cost of running power to the home shot up dramatically. That's when architect Martin Liefheber, the winner of a Canadian Mortgage and Housing Cor-

poration (CMHC) sponsored design competition for an off-grid home in Toronto, persuaded them to leave the power lines behind.

"The house cost more to build than a regular house, and if the cost of running power lines in hadn't been so high, we probably wouldn't have considered this option," says MacDonald. "Essentially, we capitalized all our energy costs, paying them upfront in the construction of the house."

The three-bedroom, three-bathroom house features passive solar heating, a hydronic radiant flooring system, a masonry stove, solar electric panels and a wind turbine. Backup heat is rarely provided by a propane boiler.

The south-facing wall, consisting largely of energy-efficient windows, allows winter but not summer sun into the house. The straw bale walls on the other sides offer a healthier internal environment, as the permeable plastered walls allow vapour to travel to the outside while providing a superior insulation value overall compared to conventional walls.

"Our challenge was trying to acquire knowledge in so many areas quickly enough to fit the building schedule. We were our own system integrators, providing the link between contractors who knew their own systems but not how the whole house would interact," says MacDonald.

"As far as government support went, we were on our own, which is disappointing given the salience of the environment."

"While CMHC offers encouragement for responsible technology in building, building practices tend to be conservative. Avoiding risk means builders avoid new technology and investments that could raise the cost of a house," says MacDonald. "I think if consumers were better informed, they would be willing to pay more upfront for long-term savings. As the Ontario government allows the price of pow-

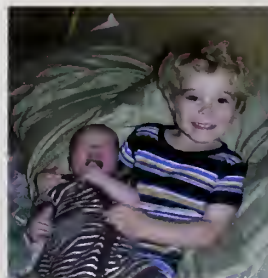
2000s

Jerrold Edson, BA/01, had his 2005 novel *The Dirty Milkman* chosen as one of the best books of the year by *Ottawa Xpress*. He is currently working on a new novel.

Jay Gutteridge, BJ/03, was named editor of the *Bradford West Gwillimbury Topic* in May. Jay lives in Newmarket, ON.



Osvaldo Jeanty, BCom/07, has signed a one-year professional basketball contract with TSV 1861 Noerdlingen of the professional A league in Germany. Noerdlingen is a town just east of Stuttgart, Germany.



join the family on August 11, 2007. Brother Jon is ecstatic. Henry was born at home during the busiest neighbourhood festival of the year, the Taste of the Danforth.

Hilde Garegg Gårdsmoen, BA/92, and her husband Thomas Gårdsmoen are thrilled to announce the birth of their second child, Tuva, born on May 10, 2007. The family resides outside Oslo, Norway. Hilde still works as a senior advisor at the Research Council of Norway. She can be reached at hgg@rcn.no.

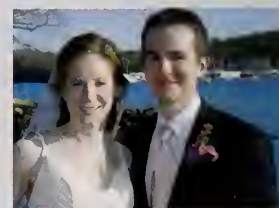
BIRTHS

Donna Lindell, BJ/90, and her husband Andrew are pleased to announce the birth of Henry Andrew. After 40 weeks and five days of pregnancy, Henry decided to finally

Julie Dyer, BJ/97, and **Steve Tasson, BAHons/99, MA/03**, are happy to announce the arrival of their daughter Lily, born on May 16, 2007. Julie is on maternity leave from Natural Resources Canada; Steve is balancing diaper duty with his teaching at Carleton and his PhD-in-progress at York University.

Erika Adams, MA/06, and Michael Adams are delighted to announce the birth of their first child, Christian Eric, born on May 20, 2007. The couple, now married for six years, resides in Ottawa where Erika is currently pursuing a PhD in public policy at Carleton University.

MARRIAGES



Jane Newton, BAHons/02, and **Andy Nielsen, BJ/02**, are happy to announce their marriage on May 2, 2007.



MacDonald and Gwen Hoover laid the ceremonial first bale of straw in their home in August 2005. Inset photo, the eco-friendly house.

er to approach the cost of producing it, maybe more people will think of true costs, which include the social and environmental price too."

What difference can one house make in our energy-guzzling society?

"People think one house doesn't make a difference, but it provides an example of individual action within limited

options," says MacDonald, whose house attracts a lot of attention in Prince Edward County. This past November, conservationist David Suzuki visited the house to film a feature for the CBC's *The Nature of Things* on its use of natural resources for energy.

Besides, for MacDonald, watching the sun rise over the trees from his solar-powered house is its own reward. ■

The couple was married in Halifax, NS, where Jane works as an editor and Andy practices law. They can be reached at pjanenewton@yahoo.ca.

Cassandra Jenkins, BA/04 (1), and Kevin Bennett married in Varadero, Cuba, in May 2007 and recently moved back to the Ottawa area.

Amanda Olliver, BJ/04 (2), and Ken Crombie

were married in Hudson, QC on November 18, 2006. Amanda is a media relations specialist for Ernst & Young. The couple now lives in Montreal.

Johanne Grenier, BA/07 (3), and Guy Castonguay were married on June 18, 2005, in Rivière-du-Loup, QC. They are looking forward to moving into their first house in Kanata this fall and starting a family.

IN MEMORIAM

Jefferson Francis, BAHons/97, MA/99, on July 4, 2007.

Marc McCormick, BA/91, on June 20, 2007.

Sergio Bottega, BA/91, on July 12, 2007.

Taylor Scrim, BSc/54, on May 11, 2007.

Patricia Goodspeed, BAHons/83, MA/88, on June 16, 2007.

Kim Rochon, BCom/81, on July 11, 2007.

Kathleen Millard, MA/75, on August 12, 2007.

Dennis Boucher, BA/71, on May 22, 2007.

Mary Biggar Peck, MA/69, on June 21, 2007.

Donald Turner, BA/70, on May 11, 2007.

James Tassie, former professor, on April 24, 2007.

Douglas Wurtele, former professor, on April 7, 2007.

Post your submission online today at magazine.carleton.ca



Convocation history

Between June 12 and 15, the 2007 graduating class of Carleton University attended eight convocation ceremonies to receive their hard-earned degrees.

BY RYAN WARD

Making history at Carleton's 130th convocation were 3,711 graduates—the largest graduating class in Carleton's history. These new graduates join well over 100,000 proud Carleton alumni in the Carleton University Alumni Association. With this being the first graduating class of the double cohort students from Ontario, the numbers were definitely up and noticeable, says Cathy Pearen, deputy clerk of Carleton University's Senate.

Naturally these ceremonies were significant milestones for the men and women who walked across the stage and received their degrees, but it was also a special occasion for the many special guests who were honoured at the ceremonies.

On June 12, Sandra Warren, a teacher from St. Joseph High School, gave the convocation address as a recipient of one of the 2007 Patrick O'Brien High School Teaching Awards. Two other high school teachers were selected to receive this award, too: Danielle Davidson-Séguin, from St. Peter High School, was recognized for serving the needs of her students as a teacher and guidance counsellor; and Tracey Friendship, from Nepean High School, was recognized for her true passion in working with special needs students. During that day's afternoon ceremony, graduates heard from honorary degree recipient Don-

ald Campbell, former assistant deputy minister for the Department of Foreign Affairs and International Trade, who also served as Canada's ambassador to Japan and Korea during his career. Carleton University's 2007 Founders Award was given out, *posthumously*, to Edward Osei Kwadwo Prempeh, PhD/96, at this ceremony as well. Prempeh was Carleton's race equity coordinator and professor in the departments of political science, and sociology and anthropology.

During the June 13 ceremonies, Anna Maria Tremonti, a two-time Gemini Award winning, CBC radio and television broadcaster, and James Youngblood Henderson, an international human rights lawyer and authority on protecting Indigenous heritage, knowledge and culture, had honorary degrees bestowed upon them.

On the morning of June 14, the convocation address was delivered by Gail Logan, president of the Ottawa Chamber of Commerce, and a member of the Board of Governors at Carleton University. That afternoon's convocation featured honorary degree recipient Tom Brzustowski, a significant contributor to research and development in Canadian engineering who served as president of the Natural Sciences and Engineering Research Council of Canada from 1995 to 2005.

On June 15, the graduates listened to a convocation address delivered by John Osborne, dean of the Faculty of Arts and Social Sciences, in the morning ceremony, while in the afternoon, Sheila Fraser, the auditor general of Canada, gave the convocation address and received her honorary degree.

One new feature at this year's ceremonies was the introduction of a song performed at each convocation ceremony by the composer Gerri Lutaaya. The song entitled "Scrapbook of My Heart" was written by this graduate of Immaculata High School in Ottawa in honour of her graduating class in June 2006. Gerri will perform again at Carleton University's fall convocation in November this year.

"Also of note at this year's convocation was the first graduating class of the Bachelor of Information Technology program—a joint program offered between Carleton University and Algonquin College," says Pearen. "Graduates from this program receive both a bachelor's degree from Carleton and an advanced diploma from Algonquin—so it is an important distinction to receive both a theoretical and practical component to this field of study." This is only one of more than 200 programs offered by the 47 departments, schools and institutes at Carleton. ■

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2007 alumni calendar

OCTOBER

Bald Ravens Chapter
Annual Alumni Game and Varsity
Season Home Opener
 October 6
 Carleton University Ice House

Annual House Laughton Hoops Classic
 October 12-14
 Carleton University Raven's Nest

MDPW Chapter
15th Anniversary Celebratory
Spa Weekend
 October 13-14
 Auberge Viceroy Resort

Halifax Branch – FOCUS Series
 October 18
 Pier 21

NOVEMBER

Ottawa Branch
Leadership Luncheon
 Date: November

Fall Convocation
 November 3
 Carleton University

Carleton University
Alumni Association
Annual General Meeting
 November 3
 Carleton University

Swimming Chapter
Annual Swim Meet & Pub Night
 November 3
 Carleton University Pool

Victoria Branch
FOCUS Series
 November 6
 The Westin Bear Mountain

Vancouver Branch
FOCUS Series
 November 7
 Vancouver Club

A.D. Dunton Alumni Award
of Distinction Presentation
 November 14
 San Diego, CA

Women's Waterpolo Chapter
20th Anniversary Celebration
(Men's Waterpolo 30th Anniversary)
 November 16-17
 Carleton University Pool

DECEMBER

Ottawa Branch at the
National Arts Centre
 December 8
 National Arts Centre

JANUARY

Capital Hoops Classic
Ravens vs. Gee Gees Basketball
 January 26
 Scotiabank Place, Ottawa

MARCH

CIS Basketball Championships
 Date: TBD
 Scotiabank Place, Ottawa

APRIL

32nd Annual All-Canada Alumni Event
 April 26
 National Press Club, Washington, D.C.

MAY

Alumni Reunion Weekend
 May 23-25
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Ex Libris

We are pleased to present a listing of recent books by graduates of Carleton University.

Pure Spring

By Brian Doyle, BJ/58, BA/61

Pure Spring is award-winning author Brian Doyle's 12th and most recently published novel. Although the narrators are young, the material is for everyone, in particular for those who remember what life was like in Ottawa in the 1950s. This story is Doyle at his best—humorous, touching and deeply serious.

Groundwood Books (Toronto) 2007; \$18.95; www.groundwoodbooks.com/gw_teens.cfm?pub_id=1170

The Inner Bird: Anatomy and Evolution

By Gary Kaiser BSc/66, MSc/71

The Inner Bird explores the relationship between birds and dinosaurs by looking at the skeletal structures and behaviours that birds have inherited from their reptilian ancestors and comparing them to the innovative characteristics of birds that have made them such a successful vertebrate.

UBC Press (Vancouver) 2007; \$85.00; www.ubcpres.ca/search/title_book.asp?BookID=4602

The Existential Joss Whedon: Evil and Human Freedom in Buffy the Vampire Slayer, Angel, Firefly and Serenity

By J. Douglas Rabb, BAHons/65, and J. Michael Richardson

This study examines the major works of contemporary American television and film screenwriter Joss Whedon. The authors argue that these works are part of an existentialist tradition that stretches back from the French atheistic existentialist Jean-Paul Sartre, through the Danish Christian existentialist Søren Kierkegaard, to the Russian novelist and existentialist Fyodor Dostoevsky.

McFarland (Jefferson) 2007; \$35.00; www.mcfarlandpub.com/book-2.php?id=978-0-7864-2781-9

The Halifax Connection

By Marie Jakober, BA/68

A Canadian counter-intelligence novel with a memorable romance at its heart, *The Halifax Connection* brings to life 1860s Montreal and Halifax with wit, action and a

finale that will leave you breathless.

Random House Canada (Toronto) 2007; \$32.00; www.randomhouse.ca/catalog/display.pperl?isbn=9780679314912

Finding the Jewish Shakespeare: The Life and Legacy of Jacob Gordin

By Beth Kaplan, BA/71

Kaplan recaptures the golden age and flamboyant actors of Yiddish theater, 1891-1910. In this revelatory biography, Kaplan sets out to explore the true character and creative achievements of her great-grandfather Jacob Gordin, playwright extraordinaire and icon of the Yiddish stage.

Syracuse University Press (Syracuse) 2007; \$24.95; www.bethkaplan.ca

Yang Taiji

By Michael Babin, BAHons/73

This is the long-time Ottawa resident's third book. It is on the martial discipline of taijiquan, an ancient form of Chinese martial arts.

Paladin Press (Boulder) 2007; \$30.00; www.paladin-press.com/detail.aspx?ID=1566

Power of Persuasion

By Kirsten Kozolanka, BAHons/75, MJ/87, PhD/03

Power of Persuasion looks at how a reinvented Conservative Party returned to power in Ontario in 1995 with a massive program to restructure government. Kozolanka argues that communications played a key role in establishing its New Right political project. Despite widespread protest, the new government was able to maintain control through a war of persuasion and limitation that moved its project forward quickly and forcibly.

Black Rose Books (Montreal) 2007; \$24.95; <http://www.blackrosebooks.net/power.htm>

Beaverbrook: A Shattered Legacy

By Jacques Poitras, BJ/90, MJ/91

Beaverbrook: A Shattered Legacy tells the story of the trans-Atlantic legal dispute over \$100-million worth of paintings between New Brunswick's Beaverbrook Art Gallery and the descendants of the Fleet Street press baron.

Goose Lane Editions (Fredericton) 2007; \$35.00; www.gooselane.com/gooselaneditions/?page_id=36

Born out of Wedlock

By Claudius Francis, MA/91

This is a study in organization development that describes what persons who are committed to change are prepared to do and the strategies that can be deployed to guarantee success.

Xlibris (Philadelphia) 2007; \$19.99; www.xlibris.com/bookstore/bookdisplay.asp?bookid=40222

Double-blind

By Michelle Butler Hallett, BAHons/93, MA/96

Double-blind takes place in the 1970s during the final icy winter of the Cold War. It is a feverish story of complicity, empathy, and the extremities of duty and love.

Killick Press (St. John's) 2007; \$19.95; www.michellebutlerhallett.com

It Happened in Canada

By Emily-Jane Hills Orford, MA/97

It Happened in Canada is a collection of short stories about extraordinary people with extraordinary stories. It is important to remember that it is people like these that have made our country what it is today, a great nation and a great place to live.

For more information, please contact the author at: ejomusic@sympatico.ca or www.3.sympatico.ca/mistymo.

A Place of Pretty Flowers

By Jerrod Edson, BA/01

Oberon Press (Ottawa) 2007; www.oberonpress.ca

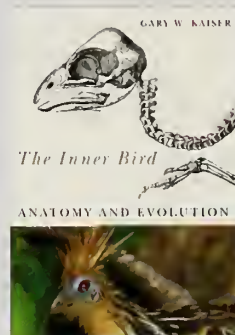
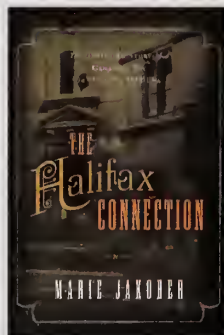
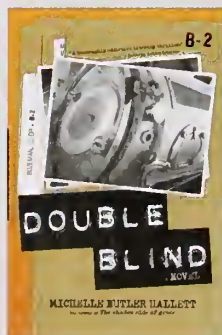
Fuelling Progress: A History of the Canadian Gas Association

By Tim Krywulak, PhD/05

This book examines the first 100 years of the Canadian Gas Association (CGA). Moving beyond the confines of a traditional administrative history, Krywulak situates the association within its wider economic and political context. By doing so, he provides a history not only of the CGA, but also of the gas industry and Canadian energy policy.

Canadian Gas Association (Ottawa) 2007; www.cga.ca/events/FuellingProgress.htm#Book

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A photograph of two men, Myron Smith and Owen Rowland, standing in a cornfield. They are surrounded by tall corn plants with large green leaves. The man on the left is wearing glasses and a light blue shirt, and the man on the right is wearing a light blue and white striped shirt. They are both looking towards the camera.

Energy plants

BY DENNIS YORK

The research of Carleton biology professors Myron Smith and Owen Rowland (left to right) is finding real world relevance in the field of biofuel development.

While there is considerable interest in increasing ethanol and biodiesel production to reduce our dependence on oil and limit the amount of greenhouse gas production, it's not a simple solution. Ethanol and biodiesel are derived from plants and added to gasoline and diesel fuel respectively to power our motor vehicles. But the way these biofuels are usually produced means they aren't as environmentally friendly as they could be. It's also currently difficult to produce enough of these fuels to make much of a difference and the process can be costly.

At present, these bioenergy sources are mostly derived from crops such as corn stover, sugarcane and soybean, which means diverting what would have been available as food to biofuel production. Common methods used to convert these plant sources into fuel often involve using natural gas, and in some cases even coal, which makes the use of biofuels less environmentally friendly and does little to reduce our dependence on non-renewable energy resources. While there are biofuel crops such as *Miscanthus* that need little care and don't tax the soil, many of the crops being converted into biofuel require significant amounts of fertilizer and water and deplete the soil. There are also the financial and environmental costs of transporting these biofuels to where they will be used.

This is where the research of Carleton biology professors Owen Rowland and Myron Smith is finding real-world relevance. They are finding ways to convert waste material, such as corn husks and straw, into ethanol and biodiesel and developing other biobased byproducts to make the process of creating biofuels more useful, environmentally friendly and cost effective.

Instead of converting crops such as corn into biofuel, Smith, associate professor, is looking into ways to convert agricultural waste such as corn husks, wheat residue, straw and even manure into biofuel. He says they are "looking for organisms that can convert those compounds that are really difficult to break down and use these organisms to our advantage. These organisms are

things that you might see in the woods or growing in your compost pile. For example, in your compost pile there are bacteria and fungi that can grow at high temperatures under rather industrial-like conditions." Finding efficient ways to convert unused or waste biomass into biofuels will have significant economic and environmental benefits. Much of this biomass can be grown where food crops seldom grow or be the byproduct of food production, such as corn husks.

Deriving other products from this biowaste makes producing these biofuels even more profitable and further reduces waste. Rowland's research into how plants protect themselves with their outer coatings has led to the discovery of byproducts such as useful waxes, oils and enzymes that can be made during the production of biofuels from plant matter. "The fundamental area of the research currently in my lab is looking at the waxy outer layer of the plant. That might seem far removed from applied application, but in fact the waxes are diverse in their chemical nature and they have a number of industrially useful properties. For example, as high-quality lubricants, and as cosmetic and food additives."

Carleton students are also benefiting from this research. Rowland and Smith have undergraduate students coming to their labs to learn more about this research, either as project students or as summer students. Since both Rowland and Smith also teach full time at Carleton, they find discussing their research during lectures makes them more engaging. When funding can be found, Rowland and Smith have undergraduate students work in their lab and give them opportunities to do some of this research at various levels.

Rowland and Smith recently applied for an Agricultural Bioproducts Innovation Program (ABIP) grant to continue this work and network with others doing this type of research and with those involved in applying the findings. If Rowland and Smith receive this ABIP grant, they expect to have more undergraduate students involved in the research, as well as

graduate students and more senior research personnel.

You can read more about the Agricultural Bioproducts Innovation Program at agr.gc.ca/abip. ■

Dennis York, BAHons/73, is a writer and editor with SimplyWrite Communications and teaches part-time at Algonquin College.



A DRIVING FORCE BEHIND ETHANOL

The auto industry first began investigating ethanol as a fuel back when Henry Ford designed the original Model T. An increasing number of vehicles are now designed to run on any gasoline with 0 to 85 per cent ethanol without modification. A 10 per cent ethanol/90 percent gasoline fuel mixture (E10) is available in over 1,000 retail outlets across Canada.

In 2004 Canada produced 245 million litres of ethanol. This number is expected to reach 1.2 billion litres over the next few years as new production plants open. In 2004 the top global producers of ethanol (in millions of litres) were: Brazil (15,388); the United States (13,950); and China (3,650).

Ethanol contains 35 per cent oxygen—adding oxygen to fuel results in more complete fuel combustion thereby reducing harmful tailpipe emissions. The Canadian government estimates that if "35 per cent of gasoline in Canada contained 10 per cent ethanol, greenhouse gas emissions would be reduced by 1.8 megatonnes per year, the equivalent of removing more than 400,000 vehicles from the road."

Source: Natural Resources Canada and Canadian Renewable Fuels Association

Power for SuRE

BY AMANDA COSTEN

It's not news that the global hunger for energy is wreaking havoc with the planet. Producing, controlling and using energy changes the landscape, exhausts finite resources, strains international relations and pollutes the environment. Finding ways to replace or improve primary energy sources such as coal, crude oil and natural gas with clean technologies and sustainable resources is a global challenge.

In addition to using renewable wind, solar, geothermal, tidal and biomass sources of energy, sustainable development requires the clever integration of renewable energy technologies into existing infrastructure and vastly improved efficiencies in non-renewable energy use. A new undergraduate program in sustainable and renewable energy (SuRE) engineering will provide students with the skills for designing, building, operating and enhancing sustainable energy systems that combine energy generation, its distribution and end use in an environmentally responsible and economically beneficial way.

Beginning in September 2008, the Carleton program is the first completely new BEng degree in Canada dedicated to sustainable and renewable energy engineering. Offered in two streams—smart technologies for power generation and distribution, and efficient energy generation and conversion—SuRE provides a balance of skills in past, current and future energy systems.

"This program leverages the expertise, facilities, and courses in all four engineering departments," says Langis Roy, professor in the Department of Electronics. The interdisciplinary program provides students with a foundation of core engineering knowledge and professional practice, essential content in theoretical and applied thermodynamics, fluid mechanics, electrical and electronic systems, power engineering, industrial design, systems and simulation, automatic control, process analysis for environmental engineering, and air pollution and emissions.

At the heart of SuRE are courses that serve the specialized needs of engineers for addressing issues related to energy conversion, distribution, and end use in a comprehensive and integrated fashion, including sustainable energy systems design and the energy economy.

"There is a great demand for specialized engineers in energy-intensive industrial organizations and related government agencies since modern societies must reduce their reliance on fossil fuels," says Roy. "From smart grids delivering energy to equipment for renewable energy projects, we'll see SuRE graduates changing how we create and use energy."

Fast fact: Designed to meet the requirements of the Canadian Engineering Accreditation Board, all new programs will be assessed when their first cohort reaches the final year of the program.

The generosity found in a name

Alumni Theatre renamed the Kailash Mital Theatre

BY KRIS FOSTER



Kailash Mital currently operates a successful daycare centre.

ness ventures during that time—but he still recalls his father's words. "My father used to say: 'You can lose everything in life, but no one can take away your education.'"

Mital took those words to heart and has spent much of his life looking for ways to support educational causes—including teaching business, finance and law for 16 years. Further yet, Mital, as a financial planner and real estate tax shelter specialist, mentored hundreds of Canadian investors—not only showing them how to pay less taxes, but also how to get rich and create wealth—through seminars, television programs and lectures. Mital is also proud of raising his children and teaching them the

successful lawyer, he gave back to the institutions that supported him. "My father remembered the generosity of the donors and helped many deserving students in his lifetime," explains Mital. "My parents made a lot of sacrifices so that I could pursue my education and whatever I am today is because of those sacrifices."

Following his father's lead, Mital and his wife Nandi have worked hard to establish a long donor history. At Carleton they have set up several scholarships including: the Rhea Mital Scholarship in Small Business Management; the Mr. and Mrs. F.C. Mital Scholarship of Chandigarh, Punjab, India; the Anil Mital Undergraduate Bursary for Entrepreneurship; and the Kyle and Monica Mital Scholarship in Finance and Accounting.

"I couldn't ask for more than to put a smile on the face of those dedicated and industrious students, who will become the backbone of our great country," says Mital.

And with that in mind, the Mitals decided to go one step further and support the renaming initiative of the Alumni Theatre A in Southam Hall to the Kailash Mital Theatre. The Kailash Mital Theatre was officially unveiled on September 29, 2007, as guests were invited to celebrate the 138th birth anniversary of Mahatma Gandhi.

"Many don't realize the generosity of Kailash Mital's latest donation—it will provide full tuition for two students in perpetuity," says Serge Arpin, chief advancement officer, Department of University Advancement.

The Kailash Mital Theatre, a 444-seat performance theatre, is the largest lecture theatre on campus. The theatre is suitable for dramatic productions, acoustic and amplified concerts, and both conferences and meetings.

"Whatever little I have done for Carleton University has really been an opportunity for me to provide back to this great institution and this great country for all that they have provided me, and countless others, in terms of providing a chance to pursue education and fulfill dreams." ■

"I arrived in Canada from India with \$8 in my pocket, an entrepreneurial spirit and the determination to succeed," recalls Kailash (Kelly) Mital. Almost 40 years have passed since he arrived in Canada—and Mital has launched numerous successful busi-

ness ventures during that time—but he still recalls his father's words. "My father used to say: 'You can lose everything in life, but no one can take away your education.'"

Mital's father educated himself thanks to the donations of the philanthropic, and when he became a suc-

Sign of the times

Another sign of alumni pride is now visible to commuters on Bronson Avenue and visitors to campus thanks to a new sign identifying Alumni Hall. The Carleton University Alumni Association pledged more than \$2.5 million towards the construction of the Alumni Hall and Sports Centre, a state-of-the-art athletics facility that opened in 2005.





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Weekend packages are available at various price points. All prices include a voluntary \$5 contribution to the Carleton University Alumni Association Bursary Fund. Each contribution will be matched by the province of Ontario, then matched again by the alumni association—raising \$20/ticket package for scholarships and bursaries at Carleton.

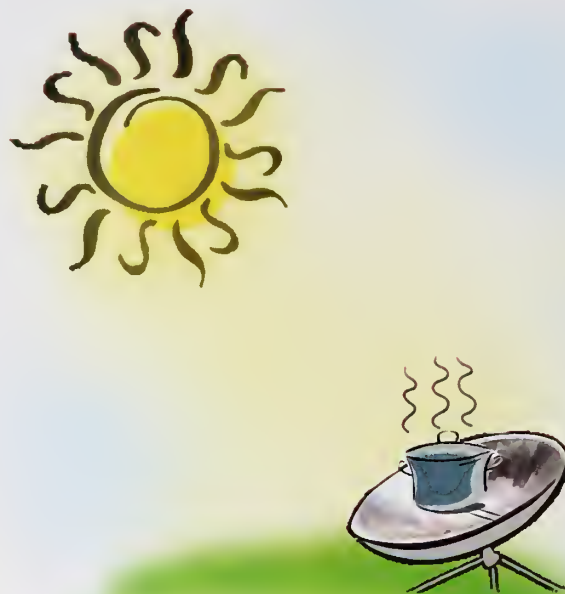
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The sun's really cooking

BY ESTHER MBITHI

One of these days I'm going to get myself a solar powered cooker. I say this a lot. In fact, this is a promise I have made to myself every year for more than 10 years now...and it's a promise that is usually made during the month of August.

August holds a special place in the hearts of the Akamba people. The Akamba, who live in the Ukambani region of Kenya, are long-distance traders who live in south-eastern Kenya between Nairobi and Mombasa—more or less along the “Lunatic Express”, a railway line that was built at the end of the nineteenth century. It is still known today as the “Lunatic Express”, but it is now a term of affection rather than scorn of yesteryears (when it was primarily known for shaky design, expensive ticket prices, travelling by hostile tribes, passenger death from diseases, and railway workers being eaten by lions). For all that was misguided in the construction of this railway line, at least it picked a route that has perfect weather. Ukambani enjoys ideal climatic conditions: sunny 12-hour days, every single day, the whole year through, with some rain thrown

in at refreshingly regular intervals to wrap up the divine package.

Hot on the heels of the May/June rains, we harvest pigeon peas (*nzûû* in Kikamba) in such plentiful supplies that the month of August has been nicknamed *mwai wa nzûû* (the month of pigeon peas). Consequently, it has become the month of choice for all kinds of festivities in Ukambani because pigeon peas, a delicacy for the Akamba people, are so readily available in August that a meal of boiled green maize and pigeon peas can be served in every homestead at every meal.

This brings me back to that solar cooker. Boiling a meal of maize and *nzûû* can take anywhere between three and six hours, depending on method and fuel used. This rules out electricity. In a country where the national grid continues to lag so far behind domestic demand that power blackouts have become the official *modus operandi* for power rationing, it's just not an option. Gas is also unreliable. Gas shortages are the order of the day. And, with each shortage the price of liquefied petroleum gas doubles, so much so that current prices are not just out of reach, but way out of sight for the majority of Kenyans.

Given all these points in favour of solar cookers in Kenya, you would think that entrepreneurs would be falling over each other in their eagerness to get the product on the market, wouldn't you? If solar energy is as cheap, clean, safe and inexhaustible as touted, then all my meals can cook themselves while I get on with the business of living. But hard as I might look, I have yet to get my hands on a solar cooker. I have occasionally come across media reports of solar cookers that are said to be positively transforming the lives of rural women, but I have never seen one. So, I ask you, why aren't these wonder gadgets in every supermarket?

And herein lies the crisis for us in sub-Saharan Africa: not that we are at risk of exhausting what we have, but that we lack the patience and dexterity to harness the power of what is freely given. ■

Esther Mbithi, MA/93, is a member of the editorial advisory committee of Carleton University Magazine. Residing in Nairobi, Kenya, Esther is our committee's first international member.

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